Natural Resources Conservation Service

United States Department of Agriculture

316 W Boone Ave Suite 450 Spokane, WA (509) 323-2900 July 2001

For additional information visit our Washington State NRI website at: http://www.wa.nrcs.usda.gov/NRI

National Resources Inventory

Resources of Washington Series

The Washington Cropland Wind Erosion Story 1982 - 1997

(Revised December 2000)

Between 1982 and 1997, the Natural Resources Conservation Service (NRCS) undertook four National Resource Inventories (1982,1987,1992 and 1997) to gather critical information about the use and management of non-federal lands. This was a very interesting period because of the advent of the 1985 Food Security Act (Farm Bill) which implemented many environmental measures addressing erosion by wind on cropland in Washington.

Emphasis was given to the Highly Erodible Land (HEL) and the Conservation Reserve Program (CRP). The HEL program required that conservation plans be developed by December 31, 1990 on all cropland fields which were determined to be highly erodible. Conservation plan provisions needed to be applied on the ground by January 1, 1995. CRP addressed highly erodible land by paying rental rates to farm operators to retire cropland for ten years or longer. Retirement refers to the establishment of perennial grass, wildlife plantings or tree plantings. In some cases, additional erosion control treatments such as grass waterways or terraces were required.

Both the CRP and HEL programs offered powerful incentives to farm operators to accomplish erosion reduction. Farm operators received yearly payments to maintain CRP and by adopting a HEL plan they remained eligible for US Department of Agriculture's (USDA) program benefits.

The National Resources Inventory (NRI) carried out by the NRCS was an ideal tool to assess the results of the CRP and HEL programs. The 1982 inventory measured conditions prior to the 1985 Farm Bill and the 1987 inventory measured conditions at the beginning of the implementation period. The 1992 inventory measured conditions after seven years of implementation. Results from the 1997 NRI bracket this entire period.

Fluctuations in commodity prices and weather related agricultural patterns have a great impact on crop acres planted as well as types of annual crops. NRI's trending database has the perspective of five years between measurements which allows a less subjective view of the totals. The NRI is also a good tool to evaluate wind erosion on cropland.

The NRCS generally evaluates soil erosion in relation to its tolerance value (T). Cropland soils in Washington generally have a T of 5 tons/acre/year as the maximum rate of erosion that is acceptable for sustaining agricultural productivity. Some cropland soils have a T of 2 tons/acre/year.

Typical soil erosion classes are:

- Less than 2 tons/acre/year (<2 t/a/y)
- 2-5 tons/acre/year (2-5 t/a/y)
- 5-10 tons/acre/year (5-10 t/a/y)
- 10 or more tons/acre/year (>10 t/a/y)

Overview of Irrigated Cropland Trends in Washington

(Refer to Figure 1)

Figure 1 displays the acres of irrigated cultivated cropland by erosion class. The figure also shows that significant wind erosion (greater than 5 tons/acre/year) on irrigated cropland is increasing in Washington. The irrigated wind erosion areas consist of all or parts of the nine counties associated with the Columbia Basin. These counties are Lincoln, Grant, Douglas, Adams, Franklin, Walla Walla, Benton, Yakima and Kittitas. This area has experienced many agricultural changes but the basic land and water resources have not changed to any great extent in the 15 years from 1982 to 1997.

The worst wind erosion areas have made significant progress in reducing erosion rates, but little improvement has been made on the less significant wind erosion areas. These counties and other eastern Washington counties contribute to fugitive dust and fine particulate matter (PM) problems. The dust and fine particulate matter problems are not measured by the NRI as they are part of the PM<10 and PM<2.5 monitoring efforts carried out by others.

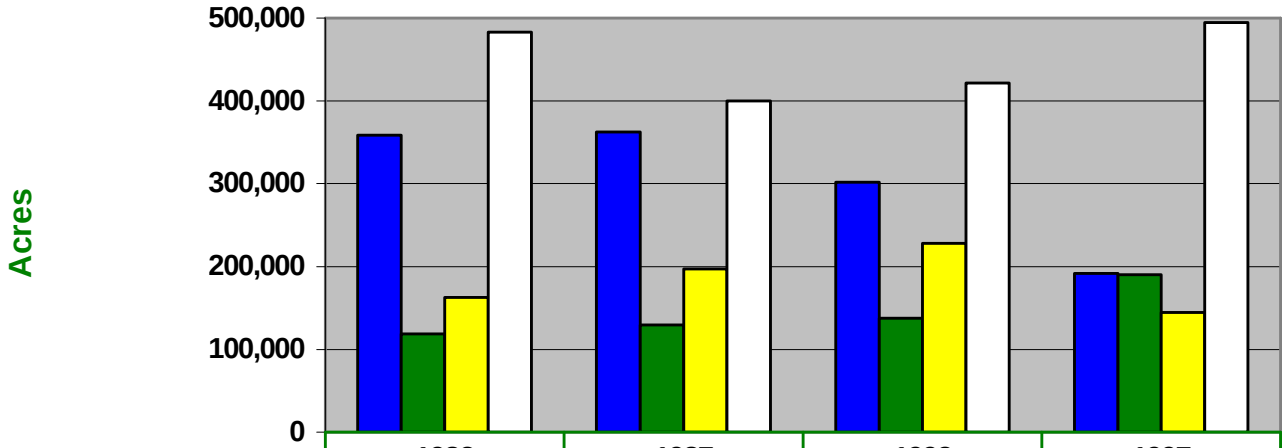
PM<10 refers to particles that are 10 microns in diameter but the designation includes all particles of this size and smaller. These minute particles, especially the very small (e.g., PM<2.5) are now considered to be a serious health concern. Solving wind erosion problems also solves a portion of the fugitive dust problem. Having appropriate conservation cover during the wind erosion period is the most effective defense for wind erosion.

Wind erosion control systems are difficult to develop and maintain with shifting commodity prices. After-crop residues can not be predicted in advance when a producer is unsure of which crop will be planted the following spring. Agricultural producers are encouraged to plant cover crops of annual grasses to protect the surface during the greatest wind erosion period. A common example of this is when the last harvested crop provides low residue levels, which is the case with onions and potatoes.

In the Columbia Basin, the worst wind erosion period is in the spring of each year.

Figure 1

Acres of Irrigated Cultivated Cropland by Erosion Class



	1982	1987	1992	1997
<2 tons/acre/year	358,700	362,800	301,900	191,700
2 - 5 tons/acre/year	118,900	129,800	137,600	190,400
5 - 10 tons/acre/year	162,800	197,100	228,400	144,600
>10 tons/acre/year	483,400	400,300	421,700	494,900

NRI Data Collection Year

Overview of Non-Irrigated Cropland Trends in Washington

(Refer to Figure 2)

Figure 2 displays the acres of wind erosion on dry cultivated cropland by erosion class. The figure also shows that wind erosion on dry cropland is increasing in the 2 - 5 tons/acre/year class. The non-irrigated wind erosion area includes all of the dry cropland in the counties listed for irrigated wind erosion plus the dry cropland in Spokane, Whitman and Klickitat counties.

The dynamics of wind erosion on dry cropland include the conversion of rangeland to cropland. Often this change in land use takes a year or more and leads to very high short-term erosion rates. This conversion initially increases wind erosion because of the time it takes to install and implement irrigation and wind erosion control systems.

Much of the decrease in the <2 tons/acre/year class is because these acres also had a water erosion problem. These acres were enrolled in the Conservation Reserve Program where the land is no longer counted in the cropland category for the purposes of the NRI. Non-irrigated cropland can have wind erosion in both the spring and fall depending on weather conditions.

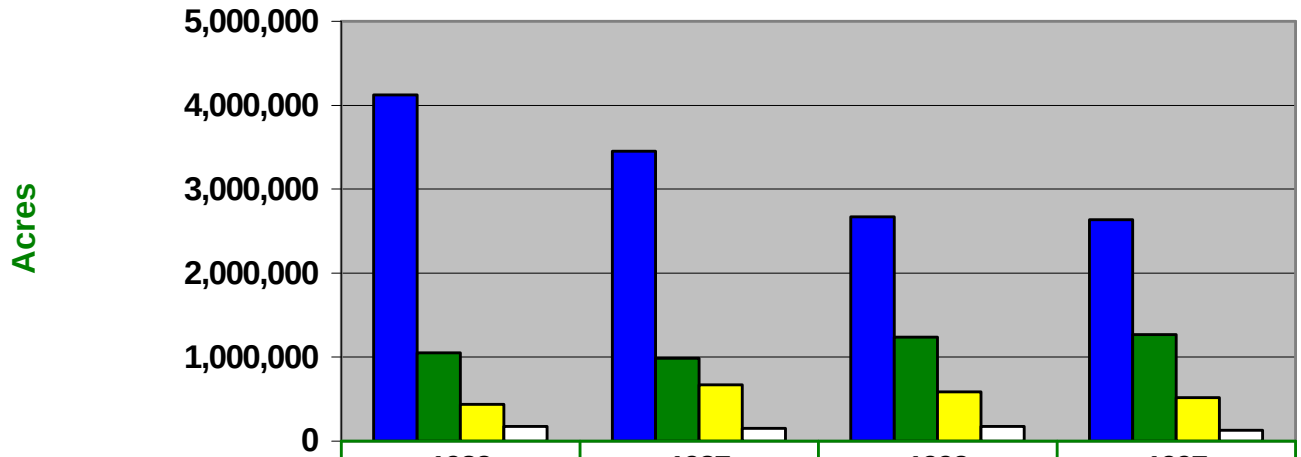
The NRI only accounts for the springtime erosion period so actual wind erosion rates might be higher. Using crop residues from previously harvested crops and minimum tillage systems can control wind erosion on dry cropland. The primary problem is that deficits of crop residues occur as a result of low rainfall periods which the agricultural producer has little control of.

Increasing urbanization into areas of higher quality soils has led to more intensive use of lower quality agricultural soils. These soils are not as resistant to wind erosion. Increases in fugitive dust and fine particulate matter (PM<10 and PM<2.5) can be attributed to dry cropland as well as irrigated cropland.

Agricultural cropping systems need to be developed that treat wind and water erosion, which are economical to implement. The agricultural community has adopted many improvements but fluctuating commodity prices have limited the development and implementation of more sophisticated cropping systems.

Figure 2

Acres of Non-Irrigated Cultivated Cropland by Erosion Class



	1982	1987	1992	1997
<2 tons/acre/year	4,123,100	3,452,300	2,668,800	2,637,600
2 - 5 tons/acre/year	1,052,300	985,000	1,240,700	1,269,300
5 - 10 tons/acre/year	435,900	670,600	585,200	519,300
>10 tons/acre/year	172,600	151,500	175,600	129,300

NRI Data Collection Year